

# The Plug-In HEV to reduce Climate Change by LDV sector



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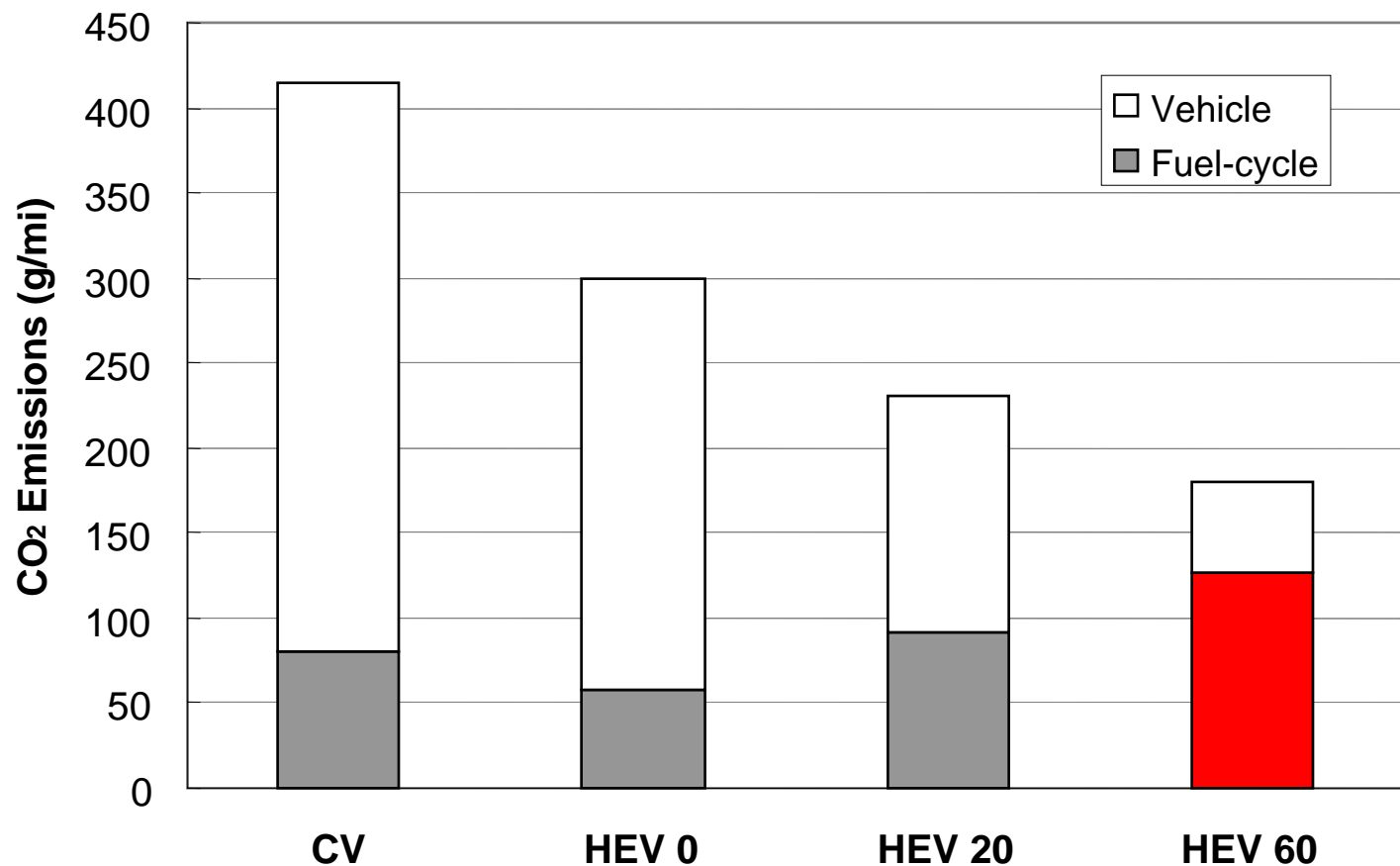


# Current situation with LDV's which are a major contributor to CO2 emissions

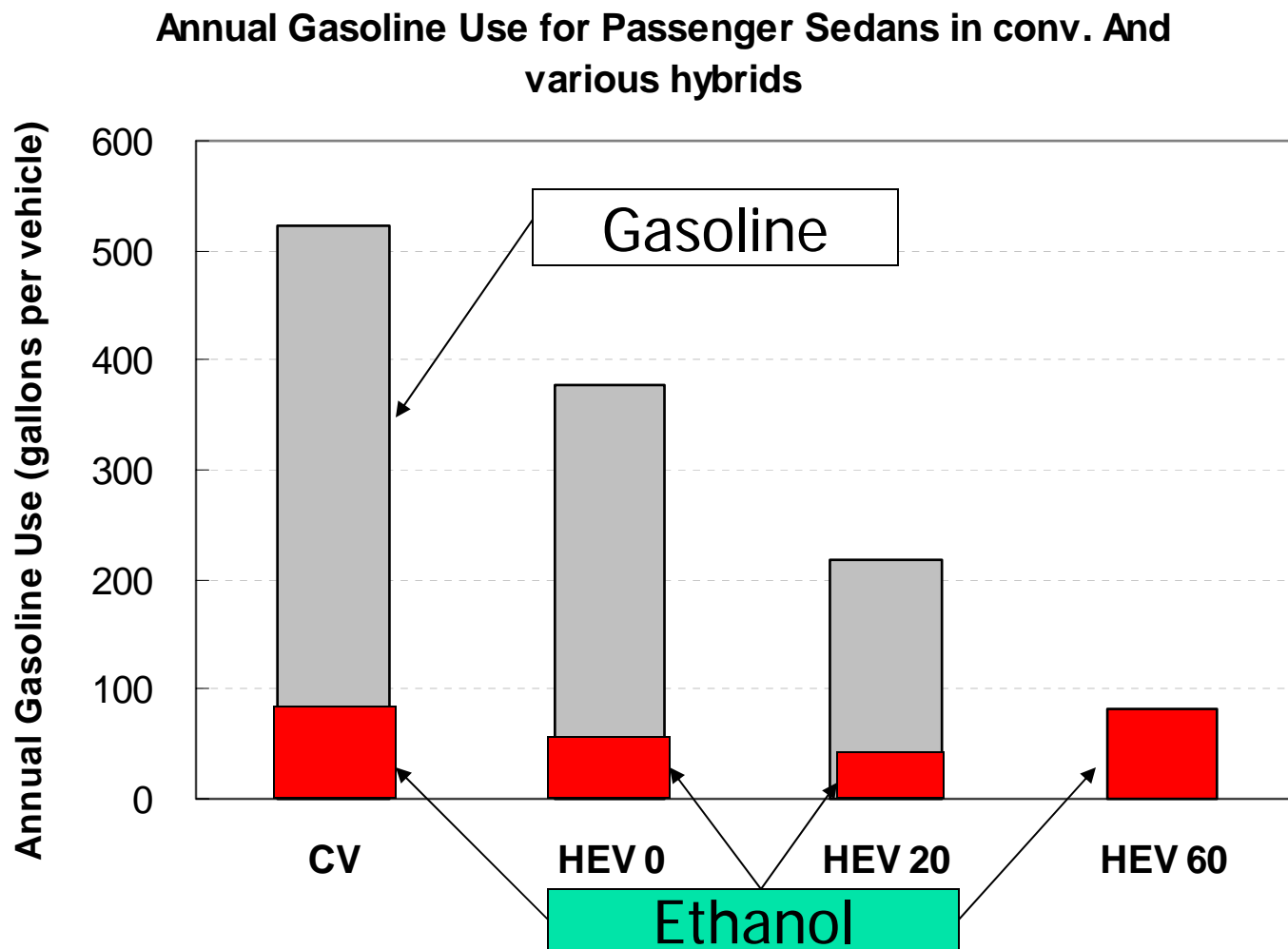
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- Cost of gasoline will continue to rise
- The Plug-In HEV is the right solution to give us a transportation energy alternative now.
- Cost of electricity remains stable
- Night time electricity is 2/3 of daily peak
- But PIHEV's are not currently being produced by the Car companies.
- Need to provide incentives to encourage car companies to produce PIHEV's

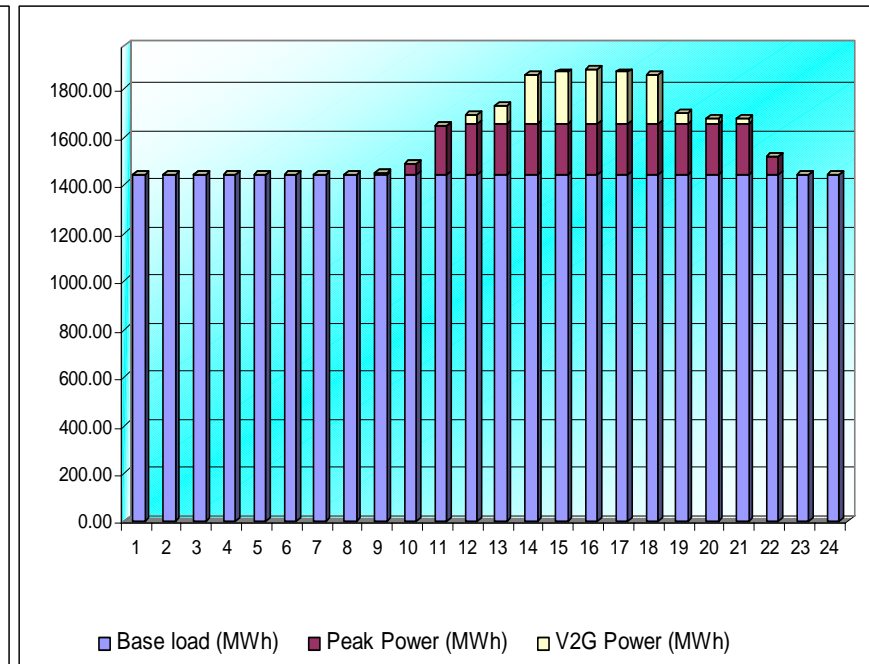
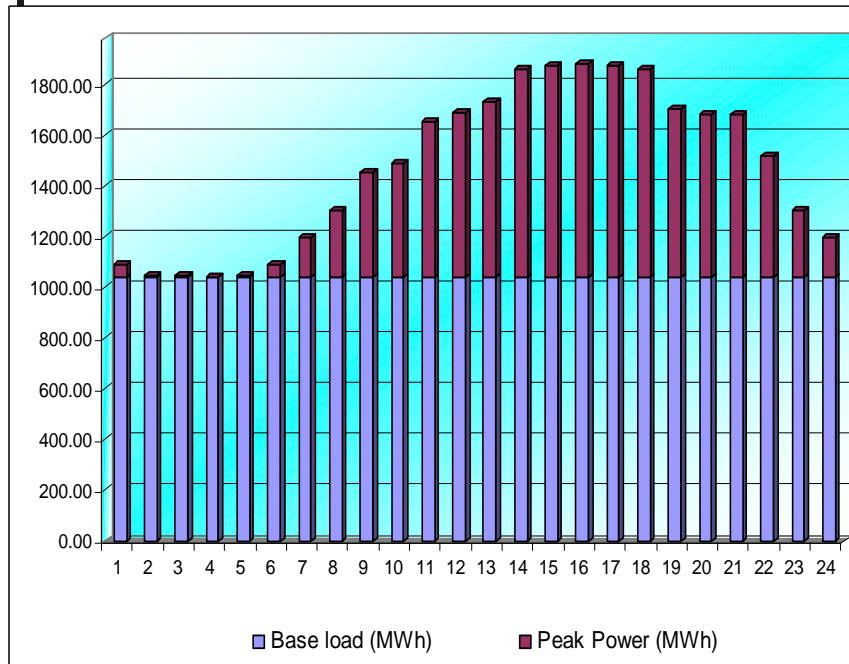
CO<sub>2</sub> Emissions for Gasoline Plug In Hybrids compared with no plug and conventional cars. Note Ethanol has no CO<sub>2</sub> cycle impact!! Thus CO<sub>2</sub> is 1/8<sup>th</sup> @60mi AER



Annual Gasoline use. **If** HEV 60 is designed for **Ethanol** and electricity then national ethanol production today for RFG is enough to supply all HEV 60's

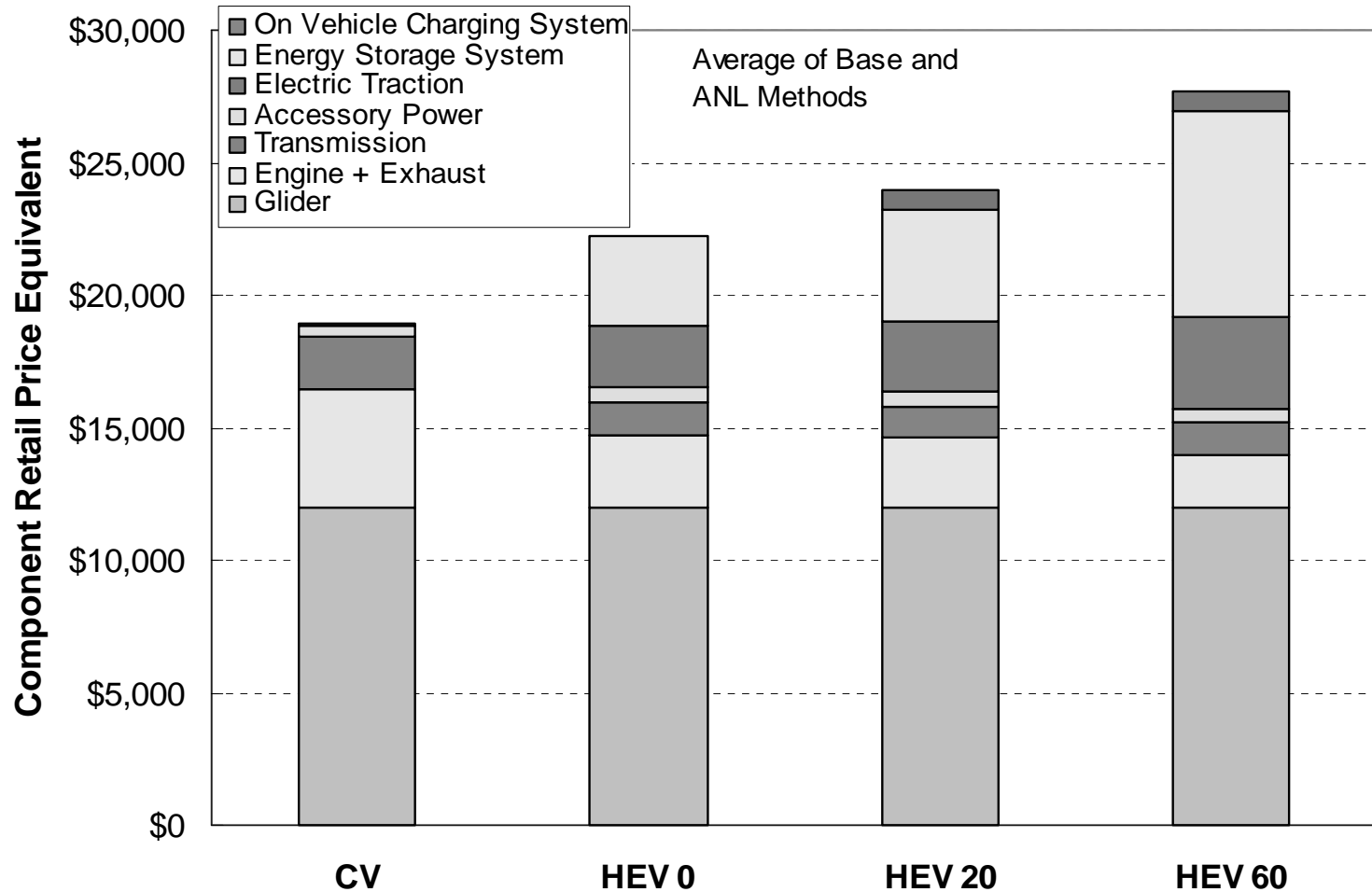


# The PIHEV can be used to balance the Electric Grid-Integrating electric power and transportation energy sectors-20% penetration

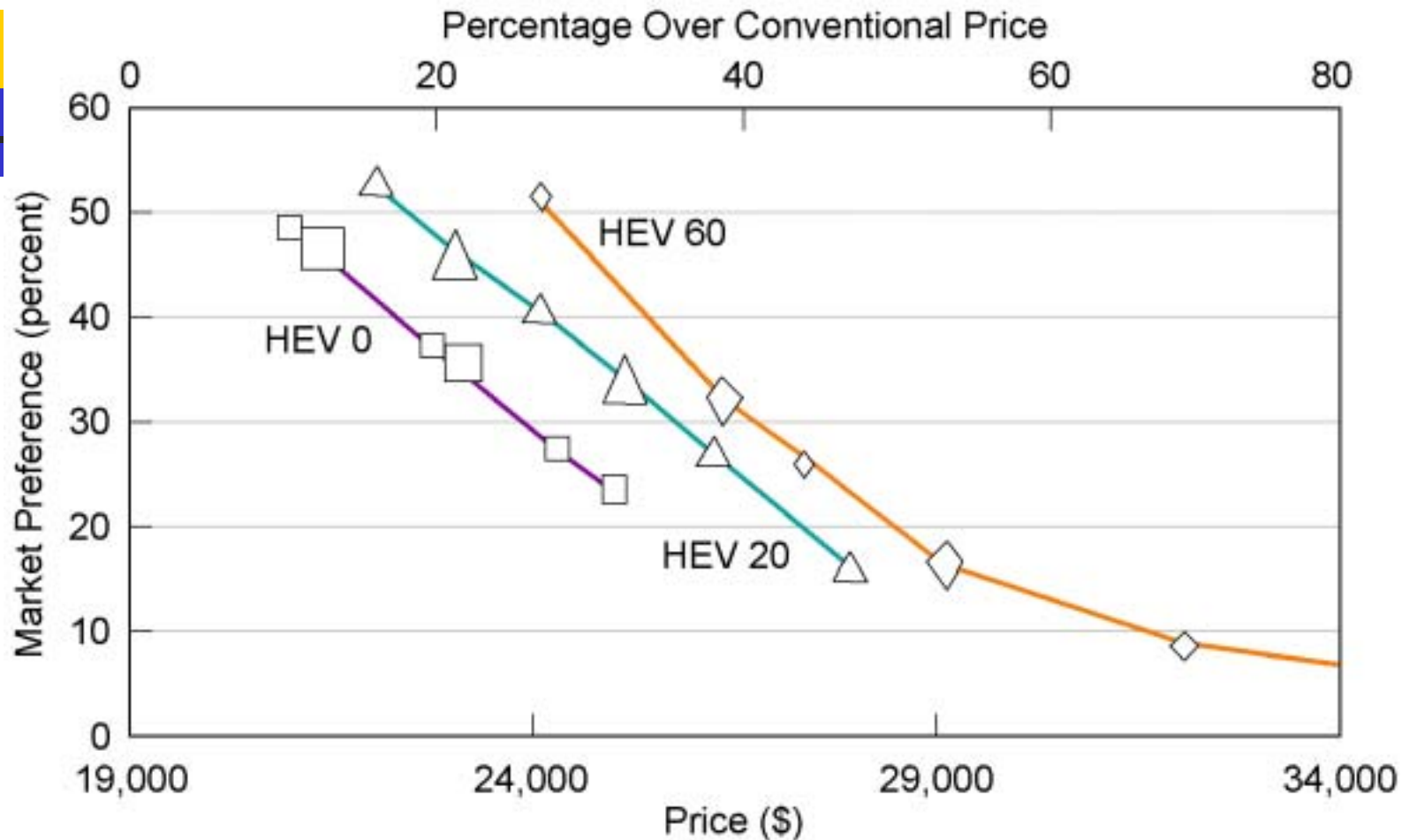


Energy available for the grid (V2G)	0	Mwh	Consumption without V2G	35300	Mwh	Total Base load before	24960	Mwh	Total Peak Power before	10340	Mwh
Nb of vehicles	125000	#	Consumption increase	5.01	%	Base load increase	38.46	%	Peak Power decrease	75.74	%

# Incremental costs for hybrids



# Mid-size HEV Market Potential



Each line represents market potential versus price for a simple market in 2010 where HEV 0 and conventional models are available in each mid-size model, or HEV 20 and conventional models compete. The six points on each line are calculated with a common methodology. The two enlarged points on each line show the base case range (before government or automaker incentives). The base case range assumes costs using 100,000 HEVs per year and also reflect different methods of estimating the retail price estimate.



# Needed incentives for the Car companies to produce PHEV's

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- Get incremental cost down to allow for 50% market penetration for PHEV's, at 20 and 60 mile electric range.
- Provide incentives to get car companies started. The incentives should decrease as time goes on and production volume drives prices down





# Incentives by CA to Ameliorate the incremental cost of PHEV's

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- State partially pays for incremental cost for the first five years in American manufactured PHEV'S to provide 50% market penetration,  $\$27k - 25k = \$2k/\text{car}$ .
- State provides additional + incentives for driving PHEV's, such as car pool lane access, parking privileges etc.
- Power companies provide nighttime rates for charging PHEV's

# Some 60 mile AER PI-HEV vehicles with CVT's constructed at UCDavis

